MS4 Best Practices: A National Perspective

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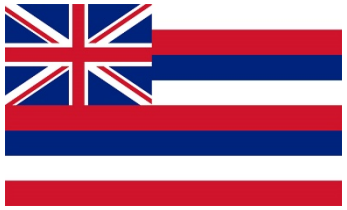
Where have we been recently? (2018-2020)



Apache Junction, AZ
Camp Verde, AZ
Cochis County, AZ
Douglas, AZ
Scottsdale, AZ
Sedona, AZ
Surprise, AZ
Yuma City, AZ
Marine Corp Air Station Yuma, AZ
Glendale, CA
Montebello, CA
Marine Corp Air Station Miramar, CA
Naval Base Coronado, CA
Industry, CA
Claremont, CA
Diamond Bar, CA
Pomona, CA
Walnut, CA
Georgia DOT, GA
Macon-Bibb, GA
City and County of Honolulu, HI
Hawaii DOT Highways Oahu, HI
County of Maui, HI
University of Hawaii Pearl City UGC, HI

Nampa, ID
Caldwell, ID
Amesbury, MA
Brockton, MA
Duxbury, MA
Gardner, MA
Lynn, MA
Methuen, MA
Washington County, MD
Richland, MS
Flowood, MS
Gulfport, MS
Moss Point, MS
Asheville, NC
Hickory, NC
Lenoir, NC
Maiden, NC
Newton, NC
Omaha, NE
Freemont, NE
Merrimack, NH
Salem, NH
Salem County, NJ
Gloucester Township, NJ
Bayonne, NJ

Hillside Township, NJ
Elko, NV
Nellis Air Force Base, NV
University of Buffalo, NY
Cheektowaga, NY
Glenville, NY
Syracuse, NY
SUNY Buffalo State College, NY
Great Neck, NY
Kings Point, NY
Columbus, OH
Williamsport, PA
Lares, PR
Hatillo, PR
Peñuelas, PR
Fajardo, PR
Hormigueros, PR
Aiken County, SC
Berkeley County, SC
Naval Weapons Station Charleston, SC
North Augusta, SC
Henrico County, VA
Fairfax County, VA
Prince William County, VA
Martinsburg, WV

Our national perspective…

Credit to unknown future stormwater professional

- *"All water crises are local or regional, as their solutions must be."*

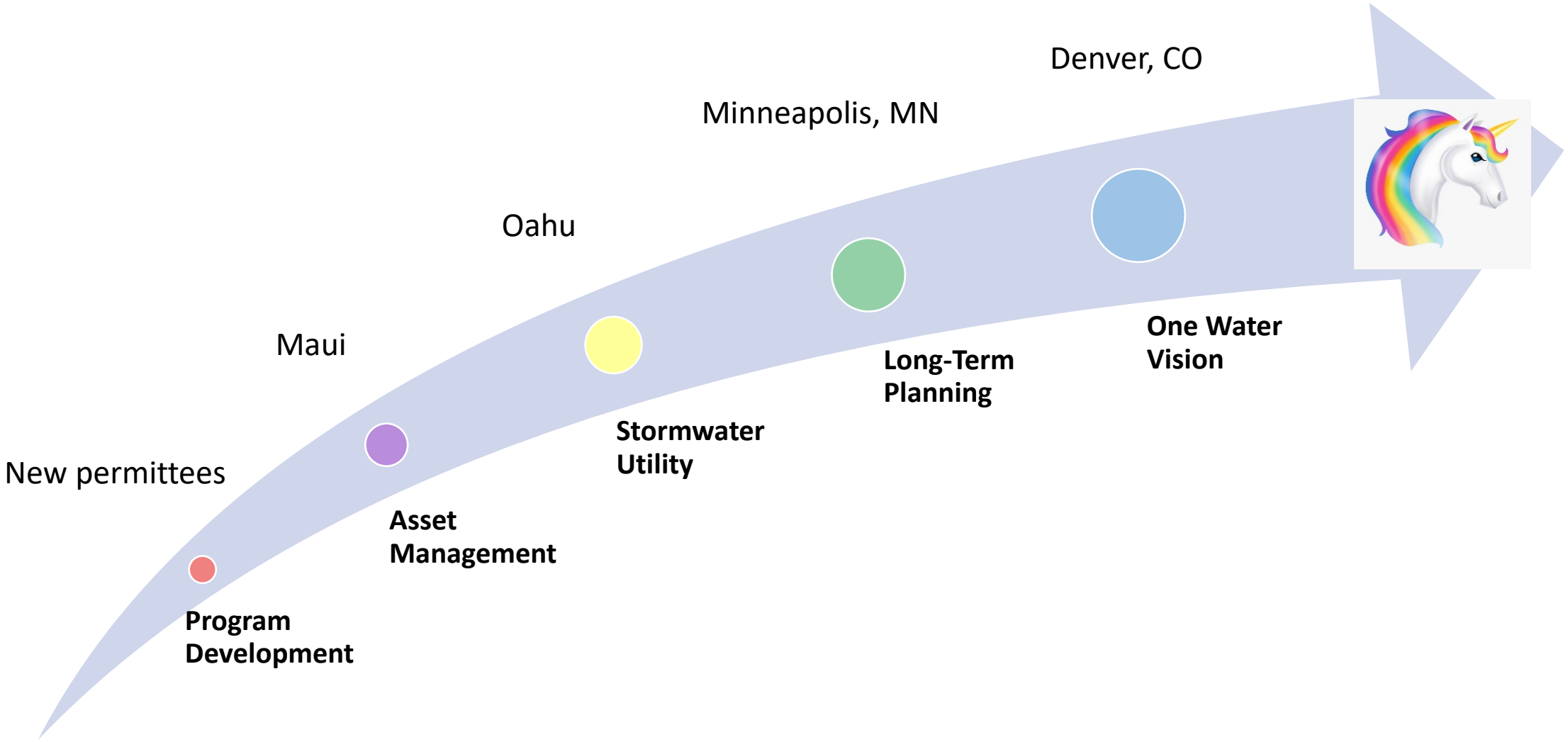
  -The Big Thirst, Charles Fishman

- Beg, borrow and steal but equally important is to <u>adapt</u> solutions to address local challenges and community needs.

- Remember the Permit is a <u>minimum</u> level of compliance. Mature programs strive to go beyond the Permit. This in turn allows the municipality to drive future Permit requirements.

  - Take the steering wheel

Stormwater program evolution



Denver one water plan

- Partnership between local drinking water, wastewater, and stormwater stakeholders to cooperatively manage the entire water cycle
- **One Water** Advisory Group (OWAG)
- Currently developing framework for sustainable water management funded in part by grant from CO Water Conservation Board
  - https://www.denvergov.org/content/denvergov/en/transportation-infrastructure/programs-services/one-water.html

Long-term planning in the City of Lakes

Minneapolis
City of Lakes

- Minneapolis water resource management plan (WRMP)
  - Part of the City's 2040 comprehensive management plan
- WRMP goal → create a holistic approach to water resource management by integrating management of both sanitary and storm sewer systems
  - http://www2.minneapolismn.gov/publicworks/stormwater/stormwater_local-surface

Oahu stormwater utility

- More than 2,000 storm water utilities across 39 states
- Provide a reliable source of funding for MS4 program implementation, capital improvement, and long-term, Island-wide stormwater master planning
  - https://www.stormwaterutilityoahu.org/

Asset management

- It is particularly hard for MS4s, especially young programs, to quantify costs
- Asset management is a means to justify resources
  - Smart data analytics allows MS4s to get the most bang for their buck
- Must account for both physical assets and institutional controls
- Helps develop permit schedules and sets permit compliance expectation
- Directly connected with GIS and CMMS
  - Complimentary: MS SharePoint, PowerBI, Google Analytics
- Common expectation in today's MS4 permit
- Asset management is being implemented all around Hawaii

Asset Management Programs for Stormwater and Wastewater Systems: Overcoming Barriers to Development and Implementation, March 2017

EPA white paper which highlights asset management development and implementation experiences of various MS4s in CA including San Diego, Orange County, Paso Robles, and South Lake Tahoe

Program development and management

MS4 program can not be the sole responsibility of one department

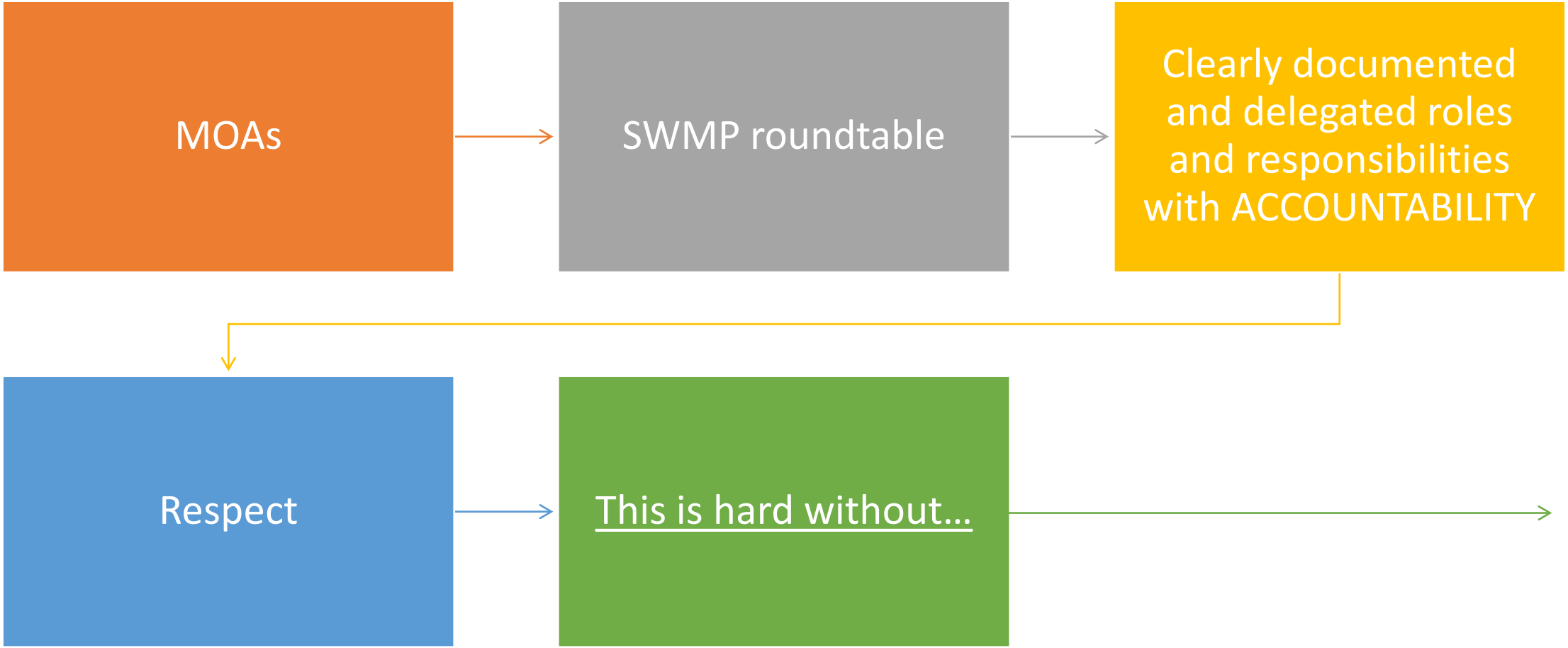
- But a single department and leader must take ownership

Centralized program with vertical AND horizontal support

- Clear organizational structure that reflects departments involved and program responsibilities
- Established line of vertical and horizontal communication
- Efforts to articulate requirements and risk of non-compliance at all levels
- Defined program "touchstone" other than *duty to comply*
- Recognized as a legitimate and valued municipal service
- Inter-department cooperation and coordination
- Clear path to management positions (vertical promotion structure)
- <u>And of course…</u>

…Big dog support

Interdepartmental cooperation and investment



…Big dog support

IDDE K9 in Tampa Bay, FL

Photo: Heather Young, Bay Soundings

MS4 is a regulatory program

Need standards and objectives

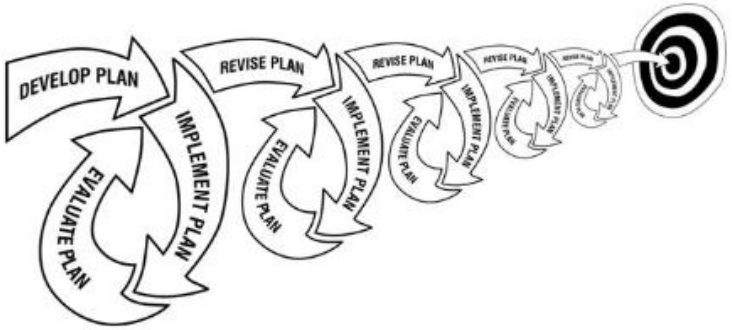
- Need a way to measure and enforce compliance with those standards
- Federal and state regulatory agencies look to local MS4 programs to serve as the local stormwater pollution regulatory authority

It is more than a regulatory program

- Resource protection program
- Waste disposal program
- Social engineering program

Effective stormwater management plan (SWMP)

- A good SWMP not only serves to meet regulatory requirements but legitimizes the program and lays groundwork (i.e. set a timeline) for future success
  - No one size fits all
  - The permit is not a checklist
- A well thought out SWMP will guide future permit requirements
  - The MS4 steers the program, unless the regulator must



City and County of Honolulu has implemented a more logical industrial and commercial facility inspection schedule than prescribed in the permit. This was communicated to HDOH, and a modification of the Permit requirement was approved.

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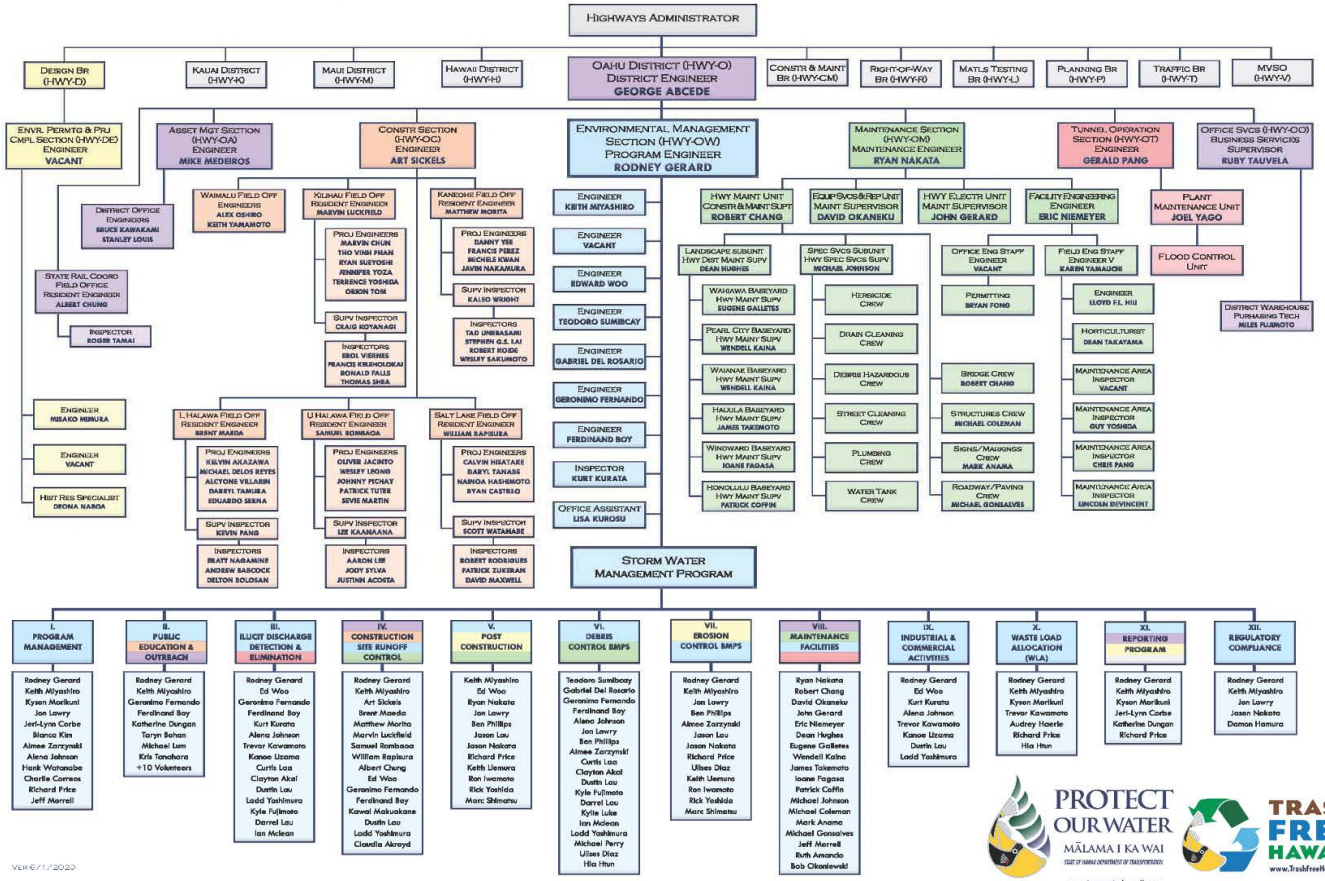
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION
www.stormwaterhawaii.com

PROGRAM MANAGEMENT

TRASH FREE HAWAI'I
www.TrashFreeHawaii.com

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION

OAHU DISTRICT STORM WATER MANAGEMENT PROGRAM ORGANIZATIONAL CHART



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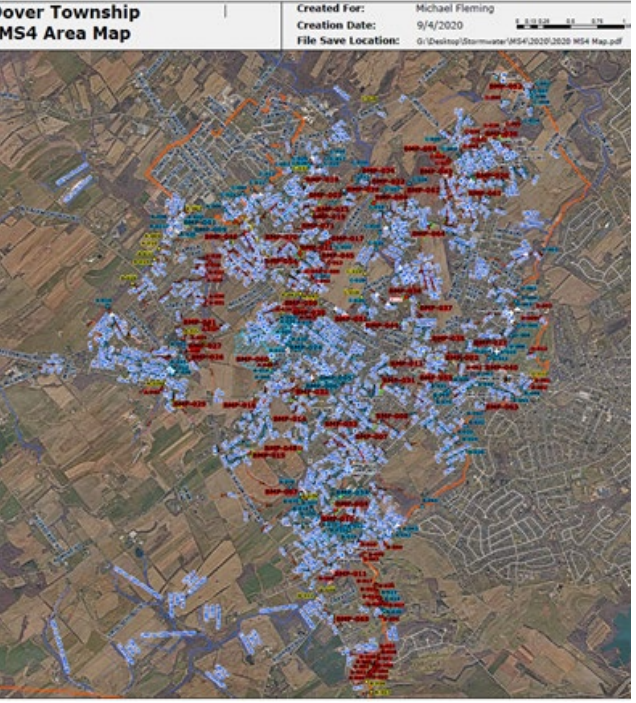
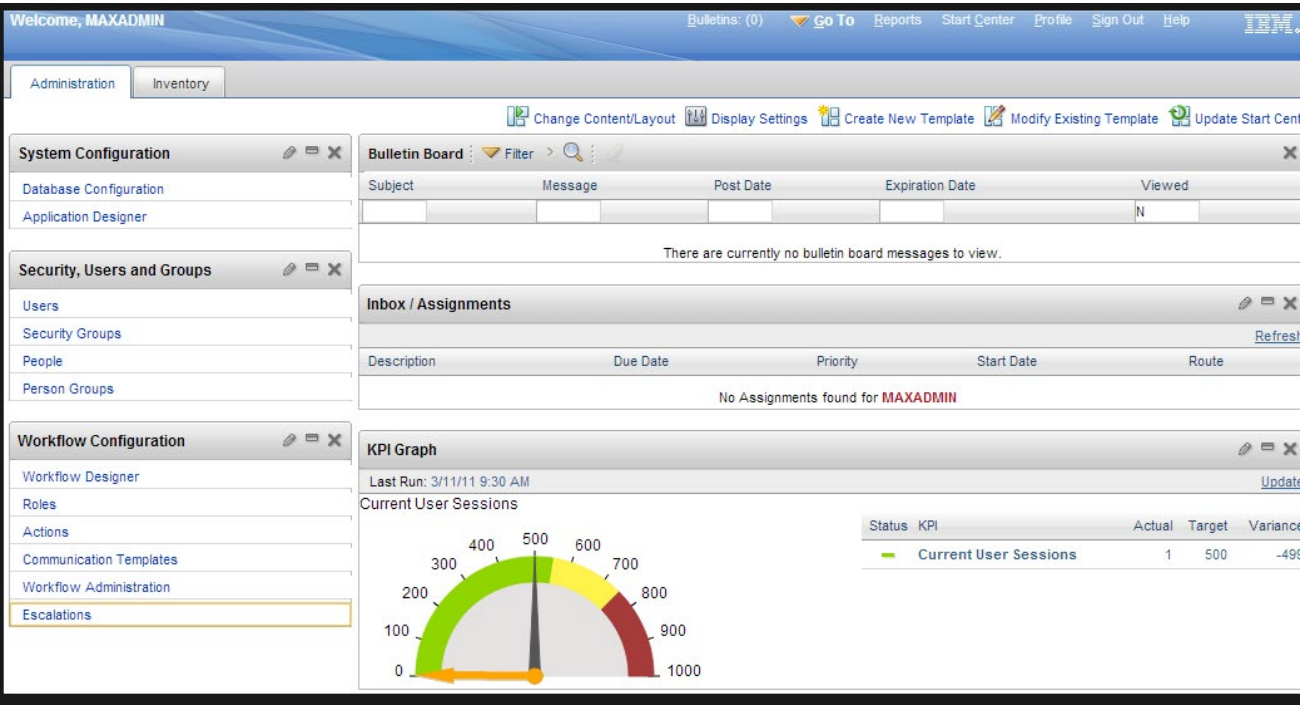
www.stormwaterhawaii.com

TRASH FREE HAWAI'I
www.TrashFreeHawaii.com

Document, Document, Document!

- If it was not documented, it did not happen
- Tools for documentation
  - Use the correct checklists and inspection forms
- Clear procedures and expectation for documentation
- Repercussions for failure to document
- Documentation management and retention procedures





Data explosion

- MS4s and regulators are both dealing with a data explosion
  - GIS-based maps and inventories
  - Asset management approaches
  - CMMS
  - Handheld devices and software applications
  - Sensors and newer monitoring technologies
  - BMP real-time control
  - E-reporting
- Manage, QA, and analyze your data
- Know your resources
- How much is enough? Avoid data for data's sake
- How to convey this data to your regulator?

Feedback loop from the field

- A continuous feedback loop from the field is critical for effective management
  - Inspectors
  - Outfall screening teams
  - Code enforcement
  - Maintenance crews
- Mobile applications allow for instantaneous data from the field to be shared with management
- Talk to each other
- Enable your staff

TxDOT Advanced Outfall Tracking System (AOTS) - GIS application with central database that holds field-collected spatial data from inspections, follow-up, and third-party info. Data accessed via internal storage system and Bing maps web app with links to stormwater survey databases. Provides near real-time tracking of information related to Agency outfalls within individual DOT districts and across the entire state of Texas.

Transparent enforcement

- Ordinances can not be effective without a policy and procedure to implement them
- Successful enforcement hinges on having multiple enforcement tools <u>available to field staff</u>
  - “If you’re a hammer, everything looks like a nail”
- Enforcement Response Plan
  - Includes all MCMs/program elements
  - Provides a roadmap for enforcement. Enforcement is not subjective.
  - Eliminates (or greatly reduces) the level of discretion needed.
  - Clearly articulated enforcement <u>options</u> and the various escalation steps
  - Clear linkage between ERP language and legal mechanism language
  - Work with your regulator but avoid over reliance

MS4 permit benefits from municipal and watershed groups partnerships

- Watershed group benefit
  - Builds capacity
  - Foster collaboration across multiple municipalities/groups
- Municipal benefit
  - Buy-in for municipal initiatives (e.g., stormwater fee)
  - Assistance meeting permit requirements
  - Volunteers
- Mutual benefit
  - Distributed cost
  - Partnership and impact in education (larger audience)
  - Extended grant opportunities
- Identifying and engaging with other MS4s can help share ideas and strategies and pool resources for program implementation

Allegheny County Conservation District

AWA ALLEGHENY WATERSHED ALLIANCE

Source: *Changing the Watershed Relationship: Collaboration of Watershed Groups and Local Government for Mutual Benefits*

Amy Miller and Rebecca Zeyzus,
Allegheny County Conservation District, PA
Allegheny Watershed Alliance

WNY Stormwater Coalition

New York State has supported regional stormwater coalitions that pool resources from various communities to help support public outreach, outfall reconnaissance, mapping, reporting, training, policy/legal authority, and SWMP development efforts

Springfield, Oregon

Public education, outreach, and participation

The Springfield, OR UpStream Art Project commissions local artists to paint storm drain murals to raise awareness of the connection between city streets and local waterways while supporting artists and beautifying the city.

Public education strategy

- Strong branding message
- Social engineering and marketing campaigns
- Increase in public support also leads to increase in level of service expectation
- Strong public support and expectation leads to big dog support
- Effective public education/outreach strategies around the country establish the following:
  - Goals and objectives
  - Clear messages that resonate with community
  - Defined target audience(s) and barriers
  - Appropriate message "packaging"
  - Effective distribution mechanisms
  - Method to evaluate effectiveness
- Public education strategy partnerships

ASHLEY COOPER
STORMWATER EDUCATION CONSORTIUM
A SERVICE OF CLEMSON EXTENSION

*The **Ashley Cooper Stormwater Education Consortium** is a partnership between communities (MS4s), universities, agencies and non-profits working together to implement a regional, watershed-scale stormwater runoff education strategy in the Charleston, SC urbanized area.*

Program branding

PROTECT OUR WATER
-MĀLAMA I KA WAI-
HDOT Highways Division – Maui District

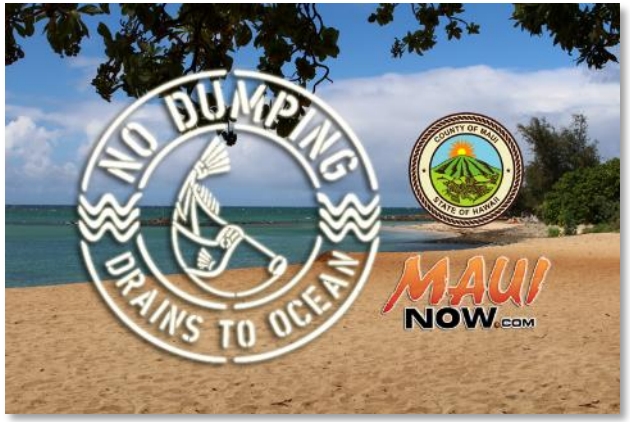
CITY AND COUNTY OF HONOLULU
STATE OF HAWAII

BE AN EVERYDAY CLEAN WATER
HERO

think BLUE
SAN DIEGO

PROTECT OUR WATER
MĀLAMA I KA WAI
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

CITY OF ROANOKE
keep it clear



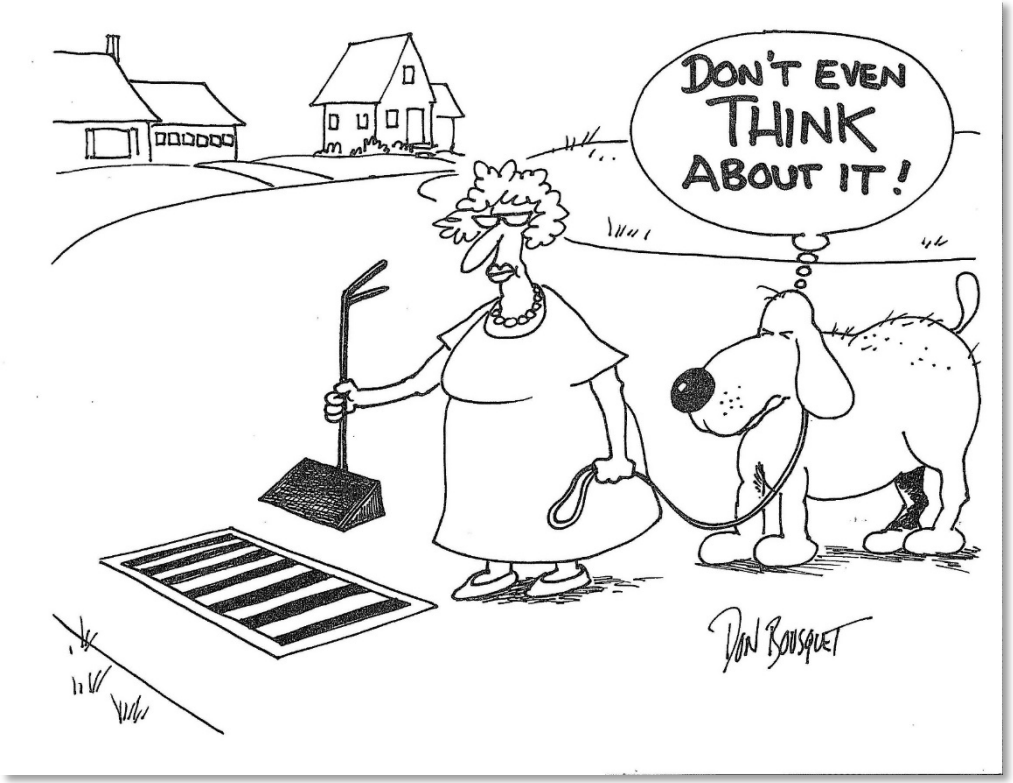
Clean Stormwater is Superior Water

Program branding to advertise municipal operations

Zebulon, North Carolina

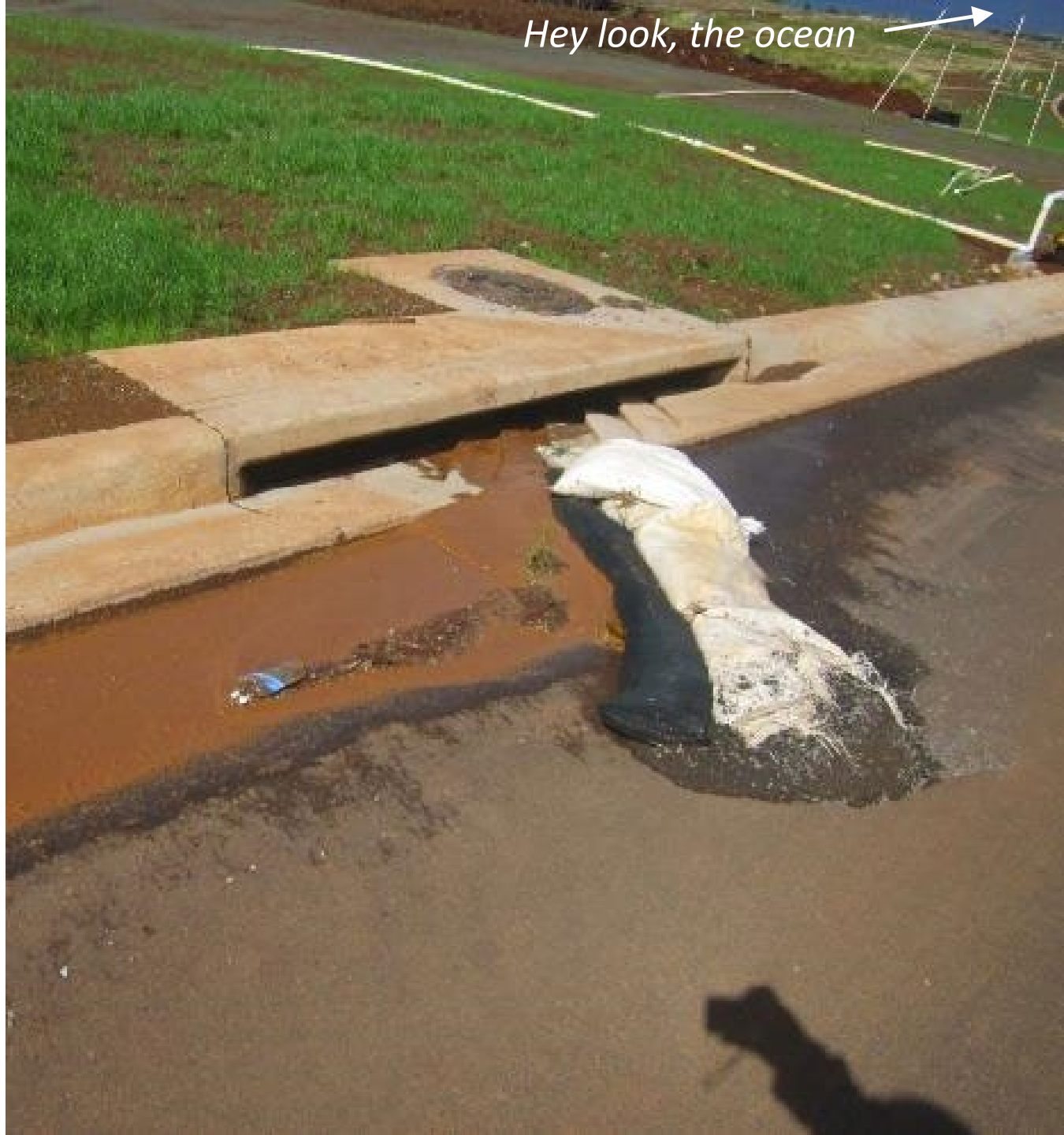
Pinellas County, Florida

Illicit discharge detection and elimination



IDDE

- Define what is illicit and assess your non-stormwater sources
- Strong legal authority
- All municipal staff should be aware of IDs and how to report them
- Progressive avenues for public reporting
  - E.g., smartphone apps
- Document the response AND the follow-up
- Innovative screening methods
  - E.g., microbial source tracking, dogs



US EPA Region 1: Outfall screening for bacteria and target compounds to identify cross connections and sewage discharges

U.S. EPA Region 1 Stormwater Toolbox RARE/RM

Riverhead Outfall - Marblehead, MA

Analyte	Result
E. coli (MPN)	31,300
Surfactants	0.75 mg/L
Ammonia	0.25 mg/L
Caffeine	3,000 ng/L
1,7-Dimethylzanthine	220 ng/L
Urobilin	980 ng/L
Cotinine	8.4 ng/L
Acetaminophen	340 ng/L
Carbamazepine	6.5 ng/L
Atenolol	14 ng/L

Results indicate sewage source

Analyte	Result
E. coli (MPN)	81,640
Surfactants	0.2 mg/L
Ammonia	0.75 mg/L
Caffeine	5.6 ng/L
1,7-Dimethylzanthine	4.4 ng/L
Urobilin	7.1 ng/L
Cotinine	0.75 ng/L
Acetaminophen	ND (2.0 ng/L)
Carbamazepine	ND (0.4 ng/L)
Atenolol	ND (2.0 ng/L)

Results indicate non-sewage source

Construction…

…and post-construction

Construction site runoff control

- Support your inspectors
  - Third party inspection programs work
- Know your bad actors, communicate with them frequently
- Communicate recalcitrant offenders with State regulators
- Set clear expectations with developers *prior* to commencement of work

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HDOT HWYs third party inspectors utilize tablets with individualized inspection checklists for each project connected to the department's AMS for both public and private projects.

Inspection frequency, reports, and deficiencies tracked through AMS by individual project allowing HDOT to track BMP deficiencies by both type and project.

AMS data used to target training and outreach for following year as part of their holistic adaptive management strategy.

Post-construction stormwater management

- View Post-Construction as a cornerstone of the overall water quality improvement program
- Recognize the program requires strategic thought
- Seek and apply ‘Big Dog Support’
- Require same standards for private and public BMPs
- Maximize data and GIS for tracking and performance
- View program as distributed treatment using permanent treatment devices and strategies

CCH submits all municipal projects to its WQR and, as such, municipal projects that trigger post-construction requirements must submit post-construction plans for review and approval prior to the issuance of other City development permits needed

Controlling pollutants and runoff from new development and redevelopment is a progressive process…

- ↓ Ordinance
- ↓ Drainage manual and standards
- ↓ Plan submittal requirements and procedures
- ↓ Plan review and approval process
- ↓ Construction oversight and completion
- ↓ BMP/site inventory and tracking
- ↓ Requirements for ongoing operation and maintenance
- ↓ Periodic inspection
- ↓ Enforcement
- ↓ *Performance testing*
- ↓ *Modeling and TMDL applicability*

Pollution prevention / good housekeeping

CCH has installed LID and source control practices at various municipal properties such as:

- *pervious pavers and trash excluders around storm drains in municipal parking lots and high traffic areas*
- *non-stormwater collection/treatment at beach parks*
- *covered vehicle wash bays that utilize wash water and rainwater capture and recycling*

Pollution prevention / good housekeeping

Starting in 2019, the City began screening street sweeping spoils through a trommel to separate trash from sediment. This allows the City to better analyze trash loading data from different corridors and provides a recycled material used as backfill for City projects.

- Investment in maintenance crews and equipment
  - Nationwide, we are hearing a common need from municipalities for more heavy equipment operations training
- Refine your training program (no more videos from 1997)
  - Make it interesting…you owe it to your staff
  - Training should be dynamic from year to year. E.g., change training based on previous year quiz scores, host hands-on BMP demonstrations, and of course….FOOD.
- Strategic planning of municipal operations to better demonstrate wasteload reductions in TMDL watersheds (e.g., street sweeping)
- Trash reduction efforts through trash excluders, source control BMPs, proactive system maintenance, hot spot oversight

Happening now in Glendale, California….

Meanwhile, somewhere in Arizona…Say cheese!

SOPs, training, and performance expectations are important

Take the steering wheel

- Direct the program where it needs to go
- Lots of effective and innovative examples to “borrow”, both in Hawaii and around the U.S.
- Understand and address local constraints and challenges
- Plan do, check, act - don't become stagnant
- Innovate, protect, and restore
- And of course…

Thank you

Credit to unknown big dog

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